CONTENTS

EDITORIAL 126 Science in the Future of India
C. N. R. Rao

NEWS OF THE WEEK 130 DOE’s Push to Train a New Generation
Falters in House
131 Researchers Generally Happy
With Final Stem Cell Rules
132 An Inside/Outside View of U.S. Science
From Science’s Online Daily News Site
134 Hughes’s Tjian Holds to a
‘Global’ Standard of Merit
135 Resignations Highlight Disagreement
on Vaccines in Autism Group
135 From the Science Policy Blog

NEWS FOCUS 136 Bringing Hominins Back to Life
Evolving Artists
>> Science Podcast
140 Straight From the Pig’s Mouth:
Swine Research With Swine Influenzas
142 Genomic Clues to DNA Treasure
Sometimes Lead Nowhere
144 Take-Charge B Cells Create a Buzz

LETTERS 146 Saving African Lions
A. Conolly
A Standardized Response to
Biological Invasions
I. Rashid et al.
Response
P. E. Hulme et al.
Neuroscientists Need Neuroethics Teaching
B. J. Sahakian and S. Morein-Zamir
147 CORRECTIONS AND CLARIFICATIONS
148 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL. 149 Science
P. Fara, reviewed by M. D. Gordin
150 The World of Soy
C. M. Du Bois et al., Eds.,
reviewed by M. A. Grusak

POLICY FORUM 151 Nuclear Waste Management in
the United States—Starting Over
R. C. Ewing and F. N. von Hippel
>> Science Podcast

PERSPECTIVES 153 Smoke and Climate Change
J. Quaas
>> Report p. 187
154 How Did the Turtle Get Its Shell?
O. Rieppel
>> Report p. 193
155 Sunspot Flows and Filaments
G. Scharmer
>> Report p. 171
156 Predicting Fatigue Failures
J. J. Kruzic
158 Sizing Up the Cell
B. A. Edgar and K. J. Kim
>> Research Article p. 167
159 Oriented Assembly of Metamaterials
K. J. Stebe et al.

REVIEW 161 Drug Discovery and Natural Products:
End of an Era or an Endless Frontier?
J. W.-H. Li and J. C. Vederas

BREVIA 166 Traction on Immobilized Netrin-1
Is Sufficient to Reorient Axons
S. W. Moore et al.
Advancing spinal neuron growth cones
generate traction forces that can direct
the trajectory of the axon.

CONTENTS continued >>

COVER
Skeletons of turtle, chicken, and mouse. The turtle body plan
is unusual in that the ribs are transformed into a carapace,
and the scapula, situated outside the ribs in other animals,
is found inside the carapace. A report on page 193 explains
the evolutionary origin of this inside-out skeletal morphology.

Drawings: Hiroshi Nagashima

www.sciencemag.org  SCIENCE  VOL 325  10 JULY 2009
Published by AAAS
RESEARCH ARTICLE

167 Cell Growth and Size Homeostasis in Proliferating Animal Cells
A. Tzur et al.
Lymphoblasts grow slowly after mitosis, then reach a constant exponential rate, indicating an active size-control mechanism.
>> Perspective p. 158

REPORTS

171 Penumbral Structure and Outflows in Simulated Sunspots
M. Rempel et al.
Simulations of sunspots show that their structure and outflows can be understood in terms of convection in a magnetic field.
>> Perspective p. 155

174 Quantum Walk in Position Space with Single Optically Trapped Atoms
M. Karski et al.
A single cesium atom trapped in an optical lattice is used to illustrate a quantum walk.

178 Experimental Realization of a Three-Dimensional Topological Insulator, Bi$_2$Te$_3$
Y. L. Chen et al.
Bi$_2$Te$_3$ is identified as a three-dimensional topological insulator with a single metallic surface state.

181 Dynamics of Chemical Bonding Mapped by Energy-Resolved 4D Electron Microscopy
F. Carbone et al.
Femtosecond tracking of an electron probe beam reveals correlated electronic and nuclear motion in laser-heated graphite.

184 Manganese- and Iron-Dependent Marine Methane Oxidation
E. J. Beal et al.
Methane oxidation in marine sediments can be driven by electron acceptors like iron or manganese, not only by sulfate.

187 Consistency Between Satellite-Derived and Modeled Estimates of the Direct Aerosol Effect
G. Myhre et al.
Observational data and modeling narrows the large range of uncertainty about how much aerosols influence climate.
>> Perspective p. 153

191 Nonvolcanic Tremor Evolution and the San Simeon and Parkfield, California, Earthquakes
R. M. Nadeau and A. Guilhem
Small repeating earthquakes increased and have become periodic on the San Andreas Fault near one end of a major historic rupture.

193 Evolution of the Turtle Body Plan by the Folding and Creation of New Muscle Connections
H. Nagashima et al.
The turtle body plan, unique among amniotes, is based on the folding of an ancestral pattern during embryogenesis.
>> Perspective p. 154

197 Antigenic and Genetic Characteristics of Swine-Origin 2009 A(H1N1) Influenza Viruses Circulating in Humans
R. J. Garten et al.
Evolutionary analysis suggests a triple reassortant avian-to-pig origin for the 2009 influenza A(H1N1) outbreak.

201 Caloric Restriction Delays Disease Onset and Mortality in Rhesus Monkeys
R. J. Colman et al.
Age-associated death and onset of pathologies are delayed by controlled caloric restriction, thus prolonging life span.

204 Discovery of Swine as a Host for the Reston ebolavirus
R. W. Barrette et al.
Respiratory infections in pigs in the Philippines are associated with a cocktail of viruses, including a monkey filovirus.
>> Science Podcast

207 Induction of Synaptic Long-Term Potentiation After Opioid Withdrawal
R. Drdla et al.
Withdrawal from opioids in rats induces an increase in synaptic strength in pain pathways and thereby enhances pain sensitivity.

210 A Functional Role for Adult Hippocampal Neurogenesis in Spatial Pattern Separation
C. D. Clelland et al.
Disruption of neurogenesis in a neuron-forming site in the brain impairs spatial memory functions in mice.

213 IRAP Identifies an Endosomal Compartment Required for MHC Class I Cross-Presentation
L. Saveanu et al.
Immunological dendritic cells contain an endocytic compartment involved in the cross-presentation of internalized antigens.

217 Hematopoietic Cytokines Can Instruct Lineage Choice
M. A. Rieger et al.
Single-cell tracking proves that physiological cytokines determine the developmental fate of hematopoietic progenitor cells.
Pre-Target Axon Sorting Establishes the Neural Map Topography
T. Imai et al.
The mouse olfactory topographic neural map is self-organized by interactions between axons, not directed by the target. 10.1126/science.1173596

Dependence of Mouse Embryonic Stem Cells on Threonine Catabolism
J. Wang et al.
Mouse embryonic stem cells exist in a high-flux metabolic state comparable to that of rapidly dividing bacteria. 10.1126/science.1173288

Flexible Learning of Multiple Speech Structures in Bilingual Infants
A. M. Kovács and J. Mehler
Exposure to two languages facilitates the development of a more flexible associative learning capacity. 10.1126/science.1173947

Positive Selection of Tyrosine Loss in Metazoan Evolution
C. S. H. Tan et al.
Evolution of tyrosine phosphorylation as a signaling mechanism may have coincided with loss of tyrosine residues to avoid noise. 10.1126/science.1174301

The Formation of Population III Binaries from Cosmological Initial Conditions
M. J. Turk et al.
Simulations show that binary systems are likely to exist among the first generation of stars. 10.1126/science.1173540

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
H. Poinar et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-a

Response to Comment by Poinar et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
M. T. P. Gilbert et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-b

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c

Response to Comment by Goldberg et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
M. Rasmussen et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-d

Response to Comment by Goldberg et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-b

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c

Response to Comment by Goldberg et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
M. Rasmussen et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-d


Hypoxia reduces proline hydroxylation and ubiquitylation of a G protein–coupled receptor.

PERSPECTIVE: Caspase-8 for Outer Harmony
G. Sollberger and H.-D. Beer
Ablation of caspase-8 in keratinocytes activates proliferative and inflammatory responses in the epidermis.

NETWATCH: The Gene Ontology
This project develops species-independent classifiers for describing gene products; in Bioinformatics Resources.

NETWATCH: Prosite
Identify and explore protein domains; in Protein Databases.

Basic Scientists in the Clinic
B. Vastag
Scientists now have more opportunities to interact with patients.

From Research to the World of Diplomacy
E. Pain
Nicola Sasanelli left electronic engineering in Italy to become a special envoy.

Science Careers Blog
Science Careers Staff
Get frequent updates with advice, opinion, news, and funding opportunities.

SCIENCEcareers
Researchers interact with patients.

SCIENCEexpress
www.scienceexpress.org

Pre-Target Axon Sorting Establishes the Neural Map Topography
T. Imai et al.
The mouse olfactory topographic neural map is self-organized by interactions between axons, not directed by the target. 10.1126/science.1173596

Dependence of Mouse Embryonic Stem Cells on Threonine Catabolism
J. Wang et al.
Mouse embryonic stem cells exist in a high-flux metabolic state comparable to that of rapidly dividing bacteria. 10.1126/science.1173288

Flexible Learning of Multiple Speech Structures in Bilingual Infants
A. M. Kovács and J. Mehler
Exposure to two languages facilitates the development of a more flexible associative learning capacity. 10.1126/science.1173947

Positive Selection of Tyrosine Loss in Metazoan Evolution
C. S. H. Tan et al.
Evolution of tyrosine phosphorylation as a signaling mechanism may have coincided with loss of tyrosine residues to avoid noise. 10.1126/science.1174301

The Formation of Population III Binaries from Cosmological Initial Conditions
M. J. Turk et al.
Simulations show that binary systems are likely to exist among the first generation of stars. 10.1126/science.1173540

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
H. Poinar et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-a

Response to Comment by Poinar et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
M. T. P. Gilbert et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-b

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-b

Comment on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c

Response to Comment by Goldberg et al.
on “DNA from Pre-Clovis Human Coprolites in Oregon, North America”
P. Goldberg et al.
full text at www.sciencemag.org/cgi/content/full/325/5937/148-c
Editor's Summary

This copy is for your personal, non-commercial use only.

**Article Tools**
Visit the online version of this article to access the personalization and article tools:
http://science.sciencemag.org/content/325/5937

**Permissions**
Obtain information about reproducing this article:
http://www.sciencemag.org/about/permissions.dtl